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First record of *Chrysoperla asoralis* and *C. argentina* (Neuroptera: Chrysopidae) in horticultural fields of La Plata associated with the sweet pepper (*Capsicum annuum* L.)

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Primer registro de *Chrysoperla asoralis* y *C. argentina* (Neuroptera: Chrysopidae) en cultivos hortícolas de La Plata asociado a pimiento (*Capsicum annuum* L.)

RESUMEN. Los crisópidos son depredadores, económicamente importantes, de varias plagas de la agricultura. En Argentina, las especies registradas dentro del género *Chrysoperla* Steinmann, 1964 son *C. externa* (Hagen, 1861)*, C. asoralis* (Banks, 1915)*, C. argentina* (González Olazo & Reguilón, 2002) y *C. defreitasi* (Brooks, 1994). *Chrysoperla argentina* y *C. asoralis* han sido citadas asociadas con cultivos de cítricos, olivos, maíz y algodón. En la presente nota registramos, por primera vez, estas dos especies en la zona del Gran La Plata, Provincia de Buenos Aires, en asociación con el pimiento, *Capsicum annuum* L.

PALABRAS CLAVE. *Chrysoperla asoralis. Chrysoperla argentina. Chrysoperla externa. S*weet pepper.

ABSTRACT. Chrisopids are economically significant predators of several agricultural pests. In Argentina, the species recorded of *Chrysoperla* Steinmann, 1964 are *C. externa* (Hagen, 1861)*, C. asoralis* (Banks, 1915), *C. argentina* (González Olazo & Reguilón, 2002) and *C. defreitasi* (Brooks, 1994). *Chrysoperla asoralis* and *C. argentina* have been associated with citric, olive, maize and cotton crops. In the present note, we record for the first time these two species in La Plata and neighboring areas within the Buenos Aires province, in association with the sweet pepper, *Capsicum annuum* L.

KEY WORDS. *Chrysoperla asoralis. Chrysoperla argentina. Chrysoperla externa.* Sweet pepper.

The green lacewings, considered to be highly efficient predators, are used for the biological control of various pests, such as aphids, coccids, thrips, and lepidopteran larvae (Lingren *et al.*, 1968; Canard *et al.*, 1984; Greeve, 1984; Thompson, 1992; Bento *et al.*, 1997; Urbaneja *et al.*, 1999). In Argentina, the following four species of *Chrysoperla* Steimann, 1964 have been recorded: *C. externa* (Hagen, 1861), *C. asoralis* (Banks, 1915), *C. argentina* (González Olazo & Reguilón, 2002) and *C. defreitasi* (Brooks, 1994) (Montserrat & de Freitas, 2005). The first species shows a broad distribution in the Neotropical region and in Argentina it is found from the north-

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ernmost provinces down to the north of Patagonia (Adams & Penny, 1987); the second is likewise present from northern Argentina, to northern Patagonia (González Olazo & Heredia, 2007; González *et al*., 2011); *C. argentina*, however, has thus far been found only in the provinces of Salta, Chaco, La Rioja and Tucumán (González Olazo & Reguilón, 2002; Reguilón *et al*., 2006); while *C. defreitasi* has been recorded exclusively in the forests of the Yungas ecologic region in eastern Argentina (González *et al*., 2011) and in northern Patagonia (Montserrat & de Freitas, 2005). The species most thoroughly investigated is *C. externa*, with ecotoxicological studies recently having been reported (Iannacone & Lamas, 2002; Silva *et al*., 2006; Rimoldi *et al*., 2008, 2012; Schneider *et al*., 2009; Moura *et al*., 2012; Haramboure *et al*., 2013). The massive rearing and subsequent release in the field of that species has been promoted in several countries during recent years (Vargas, 1988; Daane & Yokota, 1997; Carvalho *et al*., 2002; Pappas *et al*., 2011).

The horticultural zone of La Plata is one of the most extensive in the Buenos Aires province, occupying 65% of the greenhouse-cultivated area of the province (Censo Hortiflorícola, 2005). The sweet pepper (*Capsicum annuum* L.) is one of the main crops in this region, but is attacked in both the fruit and the plant proper by several pests, such as the green peach aphid *Myzus persicae* (Sulzer) (Barbosa *et al*., 2008) and the whitefly *Bemisia tabaci* (Genadius). Both these pests are of economic significance because of their direct effect on the plant itself through the sucking of the phloem and their secondary role as vectors of viral phytopathogens. In the horticultural agroecosystems of La Plata, the presence of *C. externa* has been detected in both organic and conventional fields, and in association with these two pests (Schneider, unpublished data).

Samplings made in sweet pepper greenhous-

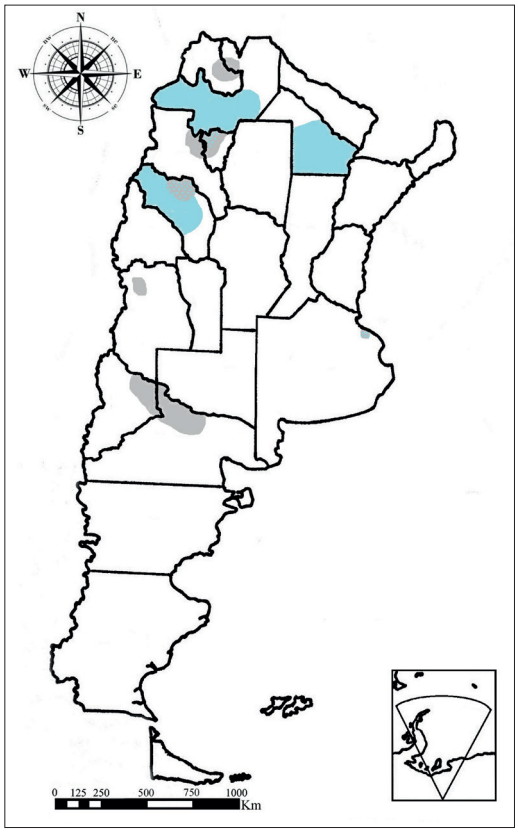
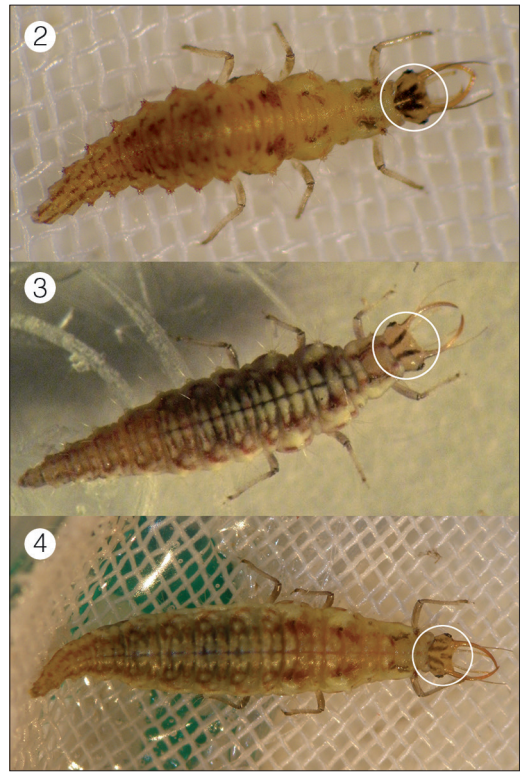


Fig. 1. Distribution map of *Chrysoperla asoralis* (gray) and *C. argentina* (light blue) in Argentina.
* Cardinal points were found in: http://sp.depositphotos.com/1075605/stock-illustration-compass-rose.html.

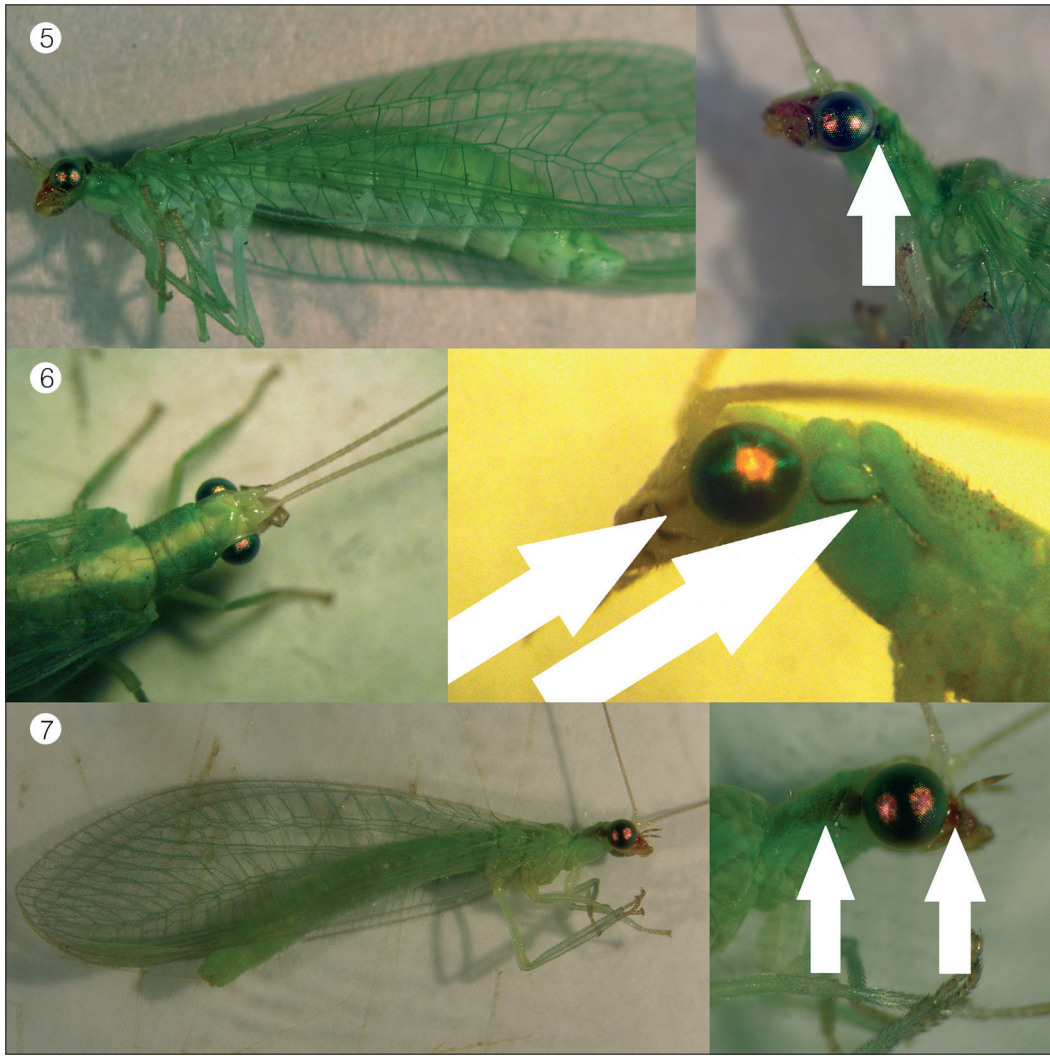


Figs. 2-4. Third instar larvae of 2) *Chrysoperla asoralis* with large rounded cephalic dorsolateral marks connected with the medium mark; 3) *C. argentina* with two narrow cephalic dorsolateral marks; 4) *C. externa* with a bifurcated anterodorsal medium mark and irregular dorsolateral marks.

es in the area of La Plata, Buenos Aires province (34° 90' 65.67" S, 58° 14' 25.71" W) resulted in the capture of numerous specimens of the genus *Chrysoperla*. The species determination was done in the Miguel Lillo Foundation through the use of taxonomic keys. The material analyzed corresponded to *C. asoralis* and *C. argentina,* thus representing the first record for both species in the Buenos Aires province (Fig. 1) in addition to the association of those species with sweet pepper.

The aim of this report is to provide a formal record of the presence of these two species in that region, gather information on their distribution, and report a new association with the sweet pepper *per se*. Furthermore, we have also included here the most relevant taxonomic characters of the larvae and adults of these species (Figs. 2-4 and 5-7).

According to González Olazo *et al.* (2011), *C. asoralis* could be displacing *C. externa* on the basis of the high number of individuals found in several locations. Although more studies in the field have to be carried out in order to corroborate the hypothesis, an initial sampling done during a two-year period indicated that *C. asoralis* was more abundant than *C. externa*. For this reason, ecotoxicological studies are presently being carried out with an emphasis on a comparison of the susceptibility to insecticides between *C. externa* and *C. asoralis* (Haramboure *et al*. unpublished data). The association of *C. asoralis* with sweet-



Figs. 5-7. Adults with head detail of 5) *Chrysoperla asoralis*, red postocular spot, pronotum without lateral bands; 6) *C. argentina*, dark brown genae; 7) *C. externa*, pronotum with red lateral bands, red genae.

pepper pests would point to that species as being a potential biologic control agent, with the possibility of ultimately being able to include this species in integrated-pest-management programs. These studies could also be useful in acquiring more information on the taxonomy of the *Chrysoperla* species before their mass rearing for field releases.

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